

CLASSENS.ST25  
SEQUENCE LISTING

<110> CLAESSENS, JOHANNES AJ  
WALTER, FUCHS

<120> RECOMBINANT INFECTIOUS LARYNGOTRACHEITIS VIRUS VACCINE

<130> 2001001US

<140> 10/TBA

<141> 2002-03-15

<150> EP012009759

<151> 2001-03-15

<160> 2

<170> PatentIn version 3.1

<210> 1

<211> 1711

<212> DNA

<213> AVIAN INFLUENZA VIRUS

<220>

<221> CDS

<222> (11)..(1705)

<223> ISOLATE A/ITALY/445/99 (H7/N1)

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10

att ccg aca agt gca gac aaa atc tgc ctt ggg cat cat gcc gtg tca  
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Ile Pro Thr Ser Ala Asp Lys Ile Cys Leu Gly His His Ala Val Ser

15

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25

aac ggg act aaa gta aac aca tta act gaa aga gga gtg gaa gtc gtt  
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1

Asn Gly Thr Lys Val Asn Thr Leu Thr Glu Arg Gly Val Glu Val Val

## CLASSENS.ST25

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	65	70	75	
atc act ggg cca ccc caa tgt gac cag ttc cta gaa ttt tca gcc gat 89 Ile Thr Gly Pro Pro Gln Cys Asp Gln Phe Leu Glu Phe Ser Ala Asp				2
	80	85	90	
cta att att gag agg cga gaa gga agt gat gtc tgt tat cct ggg aaa 37 Leu Ile Ile Glu Arg Arg Glu Gly Ser Asp Val Cys Tyr Pro Gly Lys				3
95	100	105		
ttc gtg aat gaa gaa gct ctg agg caa att ctc agg gag tca ggc gga 85 Phe Val Asn Glu Glu Ala Leu Arg Gln Ile Leu Arg Glu Ser Gly Gly				3
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att gac aag gag gca atg gga ttc aca tac agc gga ata aga act aat 33 Ile Asp Lys Glu Ala Met Gly Phe Thr Tyr Ser Gly Ile Arg Thr Asn				4
	130	135	140	
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## CLASSENS.ST25

Gly Thr Thr Ser Thr Cys Arg Arg Ser Gly Ser Ser Phe Tyr Ala Glu

145

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155

atg aaa tgg ctc ctg tca aac aca gac aat gct gct ttc ccg cag atg 5

29

Met Lys Trp Leu Leu Ser Asn Thr Asp Asn Ala Ala Phe Pro Gln Met

160

165

170

act aag tca tac aaa aac aca agg aaa gac cca gct ctg ata ata tgg 5

77

Thr Lys Ser Tyr Lys Asn Thr Arg Lys Asp Pro Ala Leu Ile Ile Trp

175

180

185

ggg atc cac cat tcc gga tca act aca gaa cag acc aag cta tat ggg 6

25

Gly Ile His His Ser Gly Ser Thr Thr Glu Gln Thr Lys Leu Tyr Gly

190

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205

agt gga aac aaa ctg ata aca gtt ggg agt tct aat tac caa cag tcc 6

73

Ser Gly Asn Lys Leu Ile Thr Val Gly Ser Ser Asn Tyr Gln Gln Ser

210

215

220

ttt gta ccg agt cca gga gag aga cca caa gtg aat ggc caa tct gga 7

21

Phe Val Pro Ser Pro Gly Glu Arg Pro Gln Val Asn Gly Gln Ser Gly

225

230

235

aga att gac ttt cat tgg ctg atg cta aac ccc aat gac aca gtc act 7

69

Arg Ile Asp Phe His Trp Leu Met Leu Asn Pro Asn Asp Thr Val Thr

240

245

250

ttc agt ttc aat ggg gcc ttc ata gct cca gac cgt gca agt ttt ctg 8

CLASSENS.ST25

17  
Phe Ser Phe Asn Gly Ala Phe Ile Ala Pro Asp Arg Ala Ser Phe Leu  
255 260 265

aga ggg aag tct atg ggg att cag agt gga gta cag gtt gat gcc aat 8  
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Arg Gly Lys Ser Met Gly Ile Gln Ser Gly Val Gln Val Asp Ala Asn  
270 275 280 285

tgt gaa gga gat tgc tat cac agt gga ggg aca ata ata agt aat ttg 9  
13  
Cys Glu Gly Asp Cys Tyr His Ser Gly Gly Thr Ile Ile Ser Asn Leu  
290 295 300

ccc ttt cag aac ata aat agc agg gca gta ggg aaa tgt ccg aga tat 9  
61  
Pro Phe Gln Asn Ile Asn Ser Arg Ala Val Gly Lys Cys Pro Arg Tyr  
305 310 315

gtt aag caa gag agt ctg ctg ctg gca aca ggg atg aag aat gtt ccc 10  
09  
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320 325 330

gaa att cca aaa gga tcg cgt gtg agg aga ggc cta ttt ggt gct ata 10  
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Glu Ile Pro Lys Gly Ser Arg Val Arg Arg Gly Leu Phe Gly Ala Ile  
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gcg ggt ttc att gaa aat gga tgg gaa ggt ctg att gat ggg tgg tat 11  
05  
Ala Gly Phe Ile Glu Asn Gly Trp Glu Gly Leu Ile Asp Gly Trp Tyr  
350 355 360 365

## CLASSENS.ST25

ggc ttc agg cat caa aat gca caa gga gag gga act gct gca gat tac 11  
53

Gly Phe Arg His Gln Asn Ala Gln Gly Glu Gly Thr Ala Ala Asp Tyr

370

375

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aaa agc acc caa tca gca att gat caa gta aca gga aaa ttg aac cgg 12  
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Lys Ser Thr Gln Ser Ala Ile Asp Gln Val Thr Gly Lys Leu Asn Arg

385

390

395

ctt ata gaa aaa act aac caa caa ttt gag tta ata gac aat gaa ttc 12  
49

Leu Ile Glu Lys Thr Asn Gln Gln Phe Glu Leu Ile Asp Asn Glu Phe

400

405

410

act gag gtt gaa aag caa att ggc aat gtg ata aat tgg acc aga gat 12  
97

Thr Glu Val Glu Lys Gln Ile Gly Asn Val Ile Asn Trp Thr Arg Asp

415

420

425

tcc atg aca gaa gtg tgg tcc tat aac gct gaa ctc ttg gta gca atg 13  
45

Ser Met Thr Glu Val Trp Ser Tyr Asn Ala Glu Leu Leu Val Ala Met

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435

440

445

gag aac cag cat aca att gat ctg acc gac tca gaa atg aac aaa cta 13  
93

Glu Asn Gln His Thr Ile Asp Leu Thr Asp Ser Glu Met Asn Lys Leu

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455

460

tac gaa cga gtg aag aga cta ctg aga gag aat gct gaa gaa gat ggc 14  
41

Tyr Glu Arg Val Lys Arg Leu Leu Arg Glu Asn Ala Glu Glu Asp Gly

465

470

475

## CLASSENS.ST25

act ggt tgc ttc gaa ata ttt cac aag tgt gat gac gat tgt atg gcc 14  
89

Thr Gly Cys Phe Glu Ile Phe His Lys Cys Asp Asp Asp Cys Met Ala

480

485

490

agt att aga aac aac aca tat gat cac agc aag tac agg gaa gag gca 15  
37

Ser Ile Arg Asn Asn Thr Tyr Asp His Ser Lys Tyr Arg Glu Glu Ala

495

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atg caa aat aga ata cag att gac cca gtc aaa cta agc agc ggc tac 15  
85

Met Gln Asn Arg Ile Gln Ile Asp Pro Val Lys Leu Ser Ser Gly Tyr

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515

520

525

aaa gat gtg ata ctt tgg ttt agc ttc ggg gca tca tgt ttc ata ctt 16  
33

Lys Asp Val Ile Leu Trp Phe Ser Phe Gly Ala Ser Cys Phe Ile Leu

530

535

540

ctg gcc att gca atg ggc ctt gtc ttc ata tgt gtg aga aat gga aac 16  
81

Leu Ala Ile Ala Met Gly Leu Val Phe Ile Cys Val Arg Asn Gly Asn

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555

atg cgg tgc act att tgt ata taa gtttgg 17  
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Met Arg Cys Thr Ile Cys Ile

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&lt;210&gt; 2

&lt;211&gt; 564

&lt;212&gt; PRT

&lt;213&gt; AVIAN INFLUENZA VIRUS

CLASSENS.ST25

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35 40 45

Glu Thr Val Glu Arg Thr Asn Val Pro Arg Ile Cys Ser Lys Gly Lys  
50 55 60

Arg Thr Val Asp Leu Gly Gln Cys Gly Leu Leu Gly Thr Ile Thr Gly  
65 70 75 80

Pro Pro Gln Cys Asp Gln Phe Leu Glu Phe Ser Ala Asp Leu Ile Ile  
85 90 95

Glu Arg Arg Glu Gly Ser Asp Val Cys Tyr Pro Gly Lys Phe Val Asn  
100 105 110

Glu Glu Ala Leu Arg Gln Ile Leu Arg Glu Ser Gly Gly Ile Asp Lys  
115 120 125

Glu Ala Met Gly Phe Thr Tyr Ser Gly Ile Arg Thr Asn Gly Thr Thr  
130 135 140

Ser Thr Cys Arg Arg Ser Gly Ser Ser Phe Tyr Ala Glu Met Lys Trp  
145 150 155 160

Leu Leu Ser Asn Thr Asp Asn Ala Ala Phe Pro Gln Met Thr Lys Ser  
165 170 175

Tyr Lys Asn Thr Arg Lys Asp Pro Ala Leu Ile Ile Trp Gly Ile His

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180

185

190

His Ser Gly Ser Thr Thr Glu Gln Thr Lys Leu Tyr Gly Ser Gly Asn  
195 200 205

Lys Leu Ile Thr Val Gly Ser Ser Asn Tyr Gln Gln Ser Phe Val Pro  
210 215 220

Ser Pro Gly Glu Arg Pro Gln Val Asn Gly Gln Ser Gly Arg Ile Asp  
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Phe His Trp Leu Met Leu Asn Pro Asn Asp Thr Val Thr Phe Ser Phe  
245 250 255

Asn Gly Ala Phe Ile Ala Pro Asp Arg Ala Ser Phe Leu Arg Gly Lys  
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Ser Met Gly Ile Gln Ser Gly Val Gln Val Asp Ala Asn Cys Glu Gly  
275 280 285

Asp Cys Tyr His Ser Gly Gly Thr Ile Ile Ser Asn Leu Pro Phe Gln  
290 295 300

Asn Ile Asn Ser Arg Ala Val Gly Lys Cys Pro Arg Tyr Val Lys Gln  
305 310 315 320

Glu Ser Leu Leu Leu Ala Thr Gly Met Lys Asn Val Pro Glu Ile Pro  
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Lys Gly Ser Arg Val Arg Arg Gly Leu Phe Gly Ala Ile Ala Gly Phe  
340 345 350

Ile Glu Asn Gly Trp Glu Gly Leu Ile Asp Gly Trp Tyr Gly Phe Arg  
355 360 365

His Gln Asn Ala Gln Gly Glu Gly Thr Ala Ala Asp Tyr Lys Ser Thr



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370

375

380

Gln Ser Ala Ile Asp Gln Val Thr Gly Lys Leu Asn Arg Leu Ile Glu  
 385 390 395 400

Lys Thr Asn Gln Gln Phe Glu Leu Ile Asp Asn Glu Phe Thr Glu Val  
 405 410 415

Glu Lys Gln Ile Gly Asn Val Ile Asn Trp Thr Arg Asp Ser Met Thr  
 420 425 430

Glu Val Trp Ser Tyr Asn Ala Glu Leu Leu Val Ala Met Glu Asn Gln  
 435 440 445

His Thr Ile Asp Leu Thr Asp Ser Glu Met Asn Lys Leu Tyr Glu Arg  
 450 455 460

Val Lys Arg Leu Leu Arg Glu Asn Ala Glu Glu Asp Gly Thr Gly Cys  
 465 470 475 480

Phe Glu Ile Phe His Lys Cys Asp Asp Asp Cys Met Ala Ser Ile Arg  
 485 490 495

Asn Asn Thr Tyr Asp His Ser Lys Tyr Arg Glu Glu Ala Met Gln Asn  
 500 505 510

Arg Ile Gln Ile Asp Pro Val Lys Leu Ser Ser Gly Tyr Lys Asp Val  
 515 520 525

Ile Leu Trp Phe Ser Phe Gly Ala Ser Cys Phe Ile Leu Leu Ala Ile  
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Thr Ile Cys Ile

CLASSENS.ST25

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## SEQUENCE LISTING

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 <120> Recombinant infectious laryngotracheitis virus vaccine  
 <160> 2  
 <170> PatentIn version 3.1

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 30 35 40 45

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Asn Ala Thr Glu Thr Val Glu Arg Thr Asn Val Pro Arg Ile Cys Ser	
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aaa ggg aaa agg aca gtt gac ctc ggt caa tgt gga ctt ctg gga aca	241
Lys Gly Lys Arg Thr Val Asp Leu Gly Gln Cys Gly Leu Leu Gly Thr	
65 70 75	
atc act ggg cca ccc caa tgt gac cag ttc cta gaa ttt tca gcc gat	289
Ile Thr Gly Pro Pro Gln Cys Asp Gln Phe Leu Glu Phe Ser Ala Asp	
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Leu Ile Ile Glu Arg Arg Glu Gly Ser Asp Val Cys Tyr Pro Gly Lys	
95 100 105	
ttc gtg aat gaa gaa gct ctg agg caa att ctc agg gag tca ggc gga	385
Phe Val Asn Glu Glu Ala Leu Arg Gln Ile Leu Arg Glu Ser Gly Gly	
110 115 120 125	
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Ile Asp Lys Glu Ala Met Gly Phe Thr Tyr Ser Gly Ile Arg Thr Asn	
130 135 140	
gga aca acc agt aca tgt agg aga tca gga tct tca ttc tat gca gag	481
Gly Thr Thr Ser Thr Cys Arg Arg Ser Gly Ser Ser Phe Tyr Ala Glu	
145 150 155	
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160 165 170	
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175 180 185	

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 Gly Ile His His Ser Gly Ser Thr Thr Glu Gln Thr Lys Leu Tyr Gly  
 190 195 200 205

agt gga aac aaa ctg ata aca gtt ggg agt tct aat tac caa cag tcc 673  
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 210 215 220

ttt gta ccg agt cca gga gag aga cca caa gtg aat ggc caa tct gga 721  
 Phe Val Pro Ser Pro Gly Glu Arg Pro Gln Val Asn Gly Gln Ser Gly  
 225 230 235

aga att gac ttt cat tgg ctg atg cta aac ccc aat gac aca gtc act 769  
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ttc agt ttc aat ggg gcc ttc ata gct cca gac cgt gca agt ttt ctg 817  
 Phe Ser Phe Asn Gly Ala Phe Ile Ala Pro Asp Arg Ala Ser Phe Leu  
 255 260 265

aga ggg aag tct atg ggg att cag agt gga gta cag gtt gat gcc aat 865  
 Arg Gly Lys Ser Met Gly Ile Gln Ser Gly Val Gln Val Asp Ala Asn  
 270 275 280 285

tgt gaa gga gat tgc tat cac agt gga ggg aca ata ata agt aat ttg 913  
 Cys Glu Gly Asp Cys Tyr His Ser Gly Gly Thr Ile Ile Ser Asn Leu  
 290 295 300

ccc ttt cag aac ata aat agc agg gca gta ggg aaa tgt ccg aga tat 961  
 Pro Phe Gln Asn Ile Asn Ser Arg Ala Val Gly Lys Cys Pro Arg Tyr  
 305 310 315

gtt aag caa gag agt ctg ctg ctg gca aca ggg atg aag aat gtt ccc 1009  
 Val Lys Gln Glu Ser Leu Leu Leu Ala Thr Gly Met Lys Asn Val Pro  
 320 325 330

gaa att cca aaa gga tcg cgt gtg agg aga ggc cta ttt ggt gct ata 1057  
 Glu Ile Pro Lys Gly Ser Arg Val Arg Arg Gly Leu Phe Gly Ala Ile  
 335 340 345

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 Ala Gly Phe Ile Glu Asn Gly Trp Glu Gly Leu Ile Asp Gly Trp Tyr  
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ggc ttc agg cat caa aat gca caa gga gag gga act gct gca gat tac 1153  
 Gly Phe Arg His Gln Asn Ala Gln Gly Glu Gly Thr Ala Ala Asp Tyr  
 370 375 380

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 Lys Ser Thr Gln Ser Ala Ile Asp Gln Val Thr Gly Lys Leu Asn Arg  
 385 390 395

ctt ata gaa aaa act aac caa caa ttt gag tta ata gac aat gaa ttc 1249  
 Leu Ile Glu Lys Thr Asn Gln Gln Phe Glu Leu Ile Asp Asn Glu Phe  
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act gag gtt gaa aag caa att ggc aat gtg ata aat tgg acc aga gat 1297  
 Thr Glu Val Glu Lys Gln Ile Gly Asn Val Ile Asn Trp Thr Arg Asp  
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tcc atg aca gaa gtg tgg tcc tat aac gct gaa ctc ttg gta gca atg 1345  
 Ser Met Thr Glu Val Trp Ser Tyr Asn Ala Glu Leu Leu Val Ala Met  
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gag aac cag cat aca att gat ctg acc gac tca gaa atg aac aaa cta 1393  
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 450 455 460

tac gaa cga gtg aag aga cta ctg aga gag aat gct gaa gaa gat ggc 1441  
 Tyr Glu Arg Val Lys Arg Leu Leu Arg Glu Asn Ala Glu Glu Asp Gly  
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 Thr Gly Cys Phe Glu Ile Phe His Lys Cys Asp Asp Asp Cys Met Ala  
 480 485 490

agt att aga aac aac aca tat gat cac agc aag tac agg gaa gag gca 1537  
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 495 500 505

atg caa aat aga ata cag att gac cca gtc aaa cta agc agc ggc tac 1585  
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 510 515 520 525

aaa gat gtg ata ctt tgg ttt agc ttc ggg gca tca tgt ttc ata ctt 1633  
 Lys Asp Val Ile Leu Trp Phe Ser Phe Gly Ala Ser Cys Phe Ile Leu  
 530 535 540

ctg gcc att gca atg ggc ctt gtc ttc ata tgt gtg aga aat gga aac 1681  
 Leu Ala Ile Ala Met Gly Leu Val Phe Ile Cys Val Arg Asn Gly Asn  
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<210> 2

<211> 564

<212> PRT

<213> Avian influenza virus

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			20					25					30					
Lys	Val	Asn	Thr	Leu	Thr	Glu	Arg	Gly	Val	Glu	Val	Val	Asn	Ala	Thr			
		35					40					45						
Glu	Thr	Val	Glu	Arg	Thr	Asn	Val	Pro	Arg	Ile	Cys	Ser	Lys	Gly	Lys			
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Arg	Thr	Val	Asp	Leu	Gly	Gln	Cys	Gly	Leu	Leu	Gly	Thr	Ile	Thr	Gly			
65					70					75					80			
Pro	Pro	Gln	Cys	Asp	Gln	Phe	Leu	Glu	Phe	Ser	Ala	Asp	Leu	Ile	Ile			
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Glu	Arg	Arg	Glu	Gly	Ser	Asp	Val	Cys	Tyr	Pro	Gly	Lys	Phe	Val	Asn			
			100					105					110					
Glu	Glu	Ala	Leu	Arg	Gln	Ile	Leu	Arg	Glu	Ser	Gly	Gly	Ile	Asp	Lys			
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Glu	Ala	Met	Gly	Phe	Thr	Tyr	Ser	Gly	Ile	Arg	Thr	Asn	Gly	Thr	Thr			
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Ser	Thr	Cys	Arg	Arg	Ser	Gly	Ser	Ser	Phe	Tyr	Ala	Glu	Met	Lys	Trp			
145					150					155				160				
Leu	Leu	Ser	Asn	Thr	Asp	Asn	Ala	Ala	Phe	Pro	Gln	Met	Thr	Lys	Ser			
			165						170					175				
Tyr	Lys	Asn	Thr	Arg	Lys	Asp	Pro	Ala	Leu	Ile	Ile	Trp	Gly	Ile	His			
		180						185					190					
His	Ser	Gly	Ser	Thr	Thr	Glu	Gln	Thr	Lys	Leu	Tyr	Gly	Ser	Gly	Asn			
		195					200					205						



Lys Leu Ile Thr Val Gly Ser Ser Asn Tyr Gln Gln Ser Phe Val Pro  
 210 215 220

Ser Pro Gly Glu Arg Pro Gln Val Asn Gly Gln Ser Gly Arg Ile Asp  
 225 230 235 240

Phe His Trp Leu Met Leu Asn Pro Asn Asp Thr Val Thr Phe Ser Phe  
 245 250 255

Asn Gly Ala Phe Ile Ala Pro Asp Arg Ala Ser Phe Leu Arg Gly Lys  
 260 265 270

Ser Met Gly Ile Gln Ser Gly Val Gln Val Asp Ala Asn Cys Glu Gly  
 275 280 285

Asp Cys Tyr His Ser Gly Gly Thr Ile Ile Ser Asn Leu Pro Phe Gln  
 290 295 300

Asn Ile Asn Ser Arg Ala Val Gly Lys Cys Pro Arg Tyr Val Lys Gln  
 305 310 315 320

Glu Ser Leu Leu Leu Ala Thr Gly Met Lys Asn Val Pro Glu Ile Pro  
 325 330 335

Lys Gly Ser Arg Val Arg Arg Gly Leu Phe Gly Ala Ile Ala Gly Phe  
 340 345 350

Ile Glu Asn Gly Trp Glu Gly Leu Ile Asp Gly Trp Tyr Gly Phe Arg  
 355 360 365

His Gln Asn Ala Gln Gly Glu Gly Thr Ala Ala Asp Tyr Lys Ser Thr  
 370 375 380

Gln Ser Ala Ile Asp Gln Val Thr Gly Lys Leu Asn Arg Leu Ile Glu  
 385 390 395 400

Lys Thr Asn Gln Gln Phe Glu Leu Ile Asp Asn Glu Phe Thr Glu Val  
 405 410 415

Glu Lys Gln Ile Gly Asn Val Ile Asn Trp Thr Arg Asp Ser Met Thr  
 420 425 430

Glu Val Trp Ser Tyr Asn Ala Glu Leu Leu Val Ala Met Glu Asn Gln  
 435 440 445

His Thr Ile Asp Leu Thr Asp Ser Glu Met Asn Lys Leu Tyr Glu Arg  
 450 455 460

Val Lys Arg Leu Leu Arg Glu Asn Ala Glu Glu Asp Gly Thr Gly Cys  
 465 470 475 480

Phe Glu Ile Phe His Lys Cys Asp Asp Asp Cys Met Ala Ser Ile Arg  
 485 490 495

Asn Asn Thr Tyr Asp His Ser Lys Tyr Arg Glu Glu Ala Met Gln Asn  
 500 505 510

Arg Ile Gln Ile Asp Pro Val Lys Leu Ser Ser Gly Tyr Lys Asp Val  
 515 520 525

Ile Leu Trp Phe Ser Phe Gly Ala Ser Cys Phe Ile Leu Leu Ala Ile  
 530 535 540

Ala Met Gly Leu Val Phe Ile Cys Val Arg Asn Gly Asn Met Arg Cys  
 545 550 555 560

Thr Ile Cys Ile  
 564